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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,049	09/26/2003	Kameshwar Poola	AWS-033	8058

25199 7590 02/22/2005

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EXAMINER

CABRERA, ZOILA E

ART UNIT	PAPER NUMBER
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2125

DATE MAILED: 02/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/673,049

Applicant(s)

POOLLA ET AL.

Examiner

Zoila E. Cabrera

Art Unit

2125

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-17 is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-14 is/are rejected.
- 7) ☒ Claim(s) 10, 18-21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Oath/Declaration

1. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

The filing date of Serial No. 60/469377 is incorrect, i.e., 08 **March** 2003. Please note that the filing date of the Provisional Application, 60/469,377 is 08 May 2003.

Appropriate correction is required.

Claim Objections

2. Claim 18 and therefore claims 19-21 are objected to because of the following informalities: Claim 18, line 1, recite an indefinite phrase "In a combination,". Please note that claims should clearly define either a system or method. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

Art Unit: 2125

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 12 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by **Bode et al. (US 6,535,774 B1)**.

Regarding claim 1, **Bode** discloses a method of adjusting a spatial and temporal profile of process conditions of a substrate during processing, the method being performed using a process apparatus and a controller, the controller and process apparatus being coupled so the controller is capable of controlling the spatial and temporal profile of process conditions experienced by the substrate, the controller being capable of using at least one control parameter (Figs. 1-3, and 5), the method comprising the steps of:

- i. constructing a perturbation model that relates changes in the control parameters to resulting changes in the spatial and temporal profile of process conditions experienced by the substrate (Col. 4, lines 47-52; Col. 3, lines 59-66; Col. 11, line 59 - Col. 12, line 31; Fig. 5, step 530);
- ii. using the perturbation model with at least one of a performance objective and a constraint to derive optimized control parameters (Col. 3, lines 17-25; Col. 4, lines 5-30, i.e., constraint corresponds to temperature deviations from baseline or any other variable in the model); and
- iii. operating the controller with the optimized control parameters (Col. 4, lines 56-65; Fig. 1, step 140; Fig. 5, step 540).

As for claims 2-6 **Bode** discloses,

Art Unit: 2125

- the process comprises a process used for fabricating integrated circuits on semiconductor wafers (Col. 11, lines 49-56);
- the process is **selected from the group consisting of** photolithography, plasma etch, chemical vapor deposition, thermal anneal, ion implantation, post exposure bake, and physical vapor deposition (Col. 11, lines 49-50);
- the perturbation model comprises a linear model for small changes in the spatial and temporal profile of process conditions (Col. 12, lines 18-19);
- the perturbation model comprises a nonlinear model for large changes in the spatial and temporal profile of process conditions (Col. 12, lines 18-19);
- the optimized control parameters are derived using the performance objective and the constraint (Col. 4, lines 5-18, performance objective corresponds to magnification control, constraint corresponds to temperature).

Regarding claims 12 and 14, **Bode** discloses,

- the spatial and temporal profile comprises **at least one of** temperature, plasma potential, ion energy, ion density, and heat flux for the substrate in a glow discharge plasma process (Col. 4, lines 5-7);
- the substrate is **selected from the group consisting of** semiconductor wafer, flatpanel display, and photolithography mask (Col. 9, lines 22-23).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2125

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bode et al. (US 6,535,774 B1)** in view of **Moslehi (US 5,635,409)**.

Bode discloses the limitations of claim 1 above but fail to specifically disclose the limitations of claims 7-9 and 13. However, **Moslehi** discloses such limitations as follows:

- the process includes a transient regime and a near steady-state regime and the optimized control parameters are derived in order to optimize at least one of the transient regime and the near steady-state regime (Col. 3, lines 65 – Col. 4, lines 2; Col. 15, lines 43-48);
- the substrate sensitive process includes a transient regime and a near steady-state regime and the optimized control parameters are derived in order to optimize the transient regime (Col. 3, lines 65 – Col. 4, lines 2; Col. 15, lines 43-48);
- the process includes a transient period and a near steady-state regime and the optimized control parameters are derived in order to optimize the near steady-state regime (Col. 3, lines 65 – Col. 4, lines 2; Col. 15, lines 43-48);
- the spatial and temporal profile comprises temperature of the substrate in a glow discharge plasma process (Figs. 3, 4-5; Col. 8, lines 35-45).

Therefore, it would have been obvious to a person of the ordinary skill in the art at the time the invention was made to combine the teachings of **Bode** with the real-time

temperature controller of **Moslehi** because it would provide a real-time multipoint semiconductor wafer temperature and process uniformity control system for use with a semiconductor wafer fabrication during steady-state and transient wafer heating conditions (**Moslehi**, Col. 3, lines 40-48).

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Bode et al.** (**US 6,535,774 B1**).

Regarding claim 11, **Bode** discloses the limitations of claim 1 above and further discloses providing a predetermined performance objective and a constraint; calculating adjustments for the control parameters using the performance objective, the constraint, and the perturbation model (Fig. 5, steps 520 – 540; Col. 4, lines 56-65; Col. 12, lines 5-31); and d) adjusting the control parameters in the controller and using the adjustments so as to provide the optimized control parameters (Fig. 5, step 540). **Bode** does not specifically disclose measuring an initial conditions profile of time resolved and spatially resolved data. However, **Bode** discloses modifying control inputs (Abstract).

Therefore, it would have been obvious to a person of the ordinary skill in the art at the time the invention was made to measure initial conditions profile of time resolved and spatially resolved data in order to correct any deviations of a desired output as taught by **Bode** (Col. 4, lines 56-65) because it would provide an optimum system or superior performance (Col. 12, lines 39-42).

Allowable Subject Matter

6. Claims 15-17 are allowed.

Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 18 and therefore claims 19-21 would be allowable if rewritten or amended to overcome the objection, set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter: The allowability of the claims resides in part that the closest prior art of record **Bode et al. (US 6,535,774)** does not disclose, alone or in combination, the steps of:

Regarding claims 10, 15 and 18, **acquiring data for a perturbation model for a number, N, of control parameters, N being at least 1, by performing a minimum of N temperature profile measurements, wherein each temperature profile results from perturbing one or more of the control parameters until each of the control parameters has been perturbed; constructing the perturbation model by aligning and synchronizing the temperature profile data so that the data share the same time scale to allow representing the perturbation model as $T(x,y,t)$, in combination with the other elements and features of the claimed invention.**

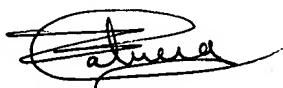
Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Art Unit: 2125

Any inquiry concerning communication or earlier communication from the examiner should be directed to Zoila Cabrera, whose telephone number is (571) 272-3738. The examiner can normally be reached on M-F from 8:00 a.m. to 5:30 p.m. EST (every other Friday).

If attempts to reach the examiner by phone fail, the examiner's supervisor, Leo Picard, can be reached on (571) 272-3749. Additionally, the fax phones for Art Unit 2125 are (703) 872-9306. Any inquiry of a general nature or relating to the status of this application should be directed to the group receptionist at (703) 305-9600.

A handwritten signature in black ink, appearing to read 'Zoila Cabrera', enclosed within a hand-drawn oval.

Zoila Cabrera
Patent Examiner
2/18/05